smp engineers llc
Civil Engineers - Surveyors

PRE AND POST CONSTRUCTION DRAINAGE CALCULATIONS

FOR

SANTA CLARA SQUARE
LOCATED AT THE CORNER OF
EL CAMINO REAL AND LAWRENCE EXPRESSWAY
SANTA CLARA CA

PREPARED BY

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Santa Clara Square
El Camino Real and Lawrence Expressway
Santa Clara, California

EXISTING CONDITION

WATER SHED INFORMATION TABLE

LOCATION	AREA (ACRES)	MATERIAL	C *
MAIN LOT			
STRUC & DWY	8.47	ROOF/AC	0.85
YARD	1.12	LANDSCAPE	0.35
WEIGHTED 'C'			0.79

* Table 5 of of County of Santa Clara "Drainage Manual"

TOTAL AREA 9.59 ACRES

Concentration Time $Tc = 0.0078 (L^{3/2}/H^{1/2})^{0.77}$ *

TIME OF CONCENTRATION TABLE

LOCATION	LENGTH ft	Diff. elev. ft	Tc min	Tc hrs
	950	5	21.54	0.36

* Section 7.3.1 on page 24 of County of Santa Clara "Drainage Manual"

FROM THE SANTA CLARA COUNTY DRAINAGE MANUAL:

The ten years rain fall intensity is given by: $I = K_{10}/T^{n10}$ *

The mean annual precipitation for this area is **15"** per year**

INTENSITY CALCULATION TABLE

LOCATION	Tol	K_{10} ***	n10 ***		I in/hr
	0.36	0.7	0.52		1.19

* Section 7.5.2 on page 30

** Figure 15

*** Figure 14

RATIONAL FORMULA= CxIxA

FLOW CALCULATION TABLE

	AREA SQFT	AREA ACRS	I in/hr	C	Q cfs
		9.59	1.19	0.79	9.05

TOTAL FLOW (Q)	9.05

Assume that total site flow reaches culvert at the lowest point in El Camino Real at the same time:

TOTAL AREA = 9.59 ACRES

Q = 9.05 cfs Existing pipe 15 " CMP

Assume @ S = 0.02

$Q = \frac{d^{8/3} s^{1/2}}{2.15n}$ Assume @ n = 0.012

= 9.94 cfs

Q = 9.94 cfs > 9.05 cfs --> Good!

Note:

There are three existing drainages system in this site. The first system, larger water shed, is being sized and checked as above.
The second drainage system is at southeast corner of Kohls, connecting to an existing 15" diameter pipe
The third drainage system is at the gas station, 15 inches diameter.
The total flow of main lot was calculated to be 9.05 cfs.
The existing 15" pipe for will handle 9.94cfs(10 years flood).
Assume the total site flow reaches the last inlet at the site all at the same time.

Santa Clara Square
El Camino Real and Lawrence Expressway
Santa Clara, California

Proposed New Site Plan

WATER SHED INFORMATION TABLE

LOCATION	AREA (ACRES)	MATERIAL	C *
MAIN LOT			
STRUC & DWY	8.3	ROOF/AC	0.85
YARD	1.2	LANDSCAPE	0.35
WEIGHTED 'C'			0.79

* Table 5 of of County of Santa Clara "Drainage Manual"

TOTAL AREA 9.5 ACRES

Concentration Time $Tc = 0.0078 (L^{3/2}/H^{1/2})^{0.77}$ *

TIME OF CONCENTRATION TABLE

LOCATION	LENGTH ft	Diff. elev. ft	Tc min	Tc hrs
	950	5	21.54	0.36

* Section 7.3.1 on page 24 of County of Santa Clara "Drainage Manual"

FROM THE SANTA CLARA COUNTY DRAINAGE MANUAL:

The ten years rain fall intensity is given by: $I = K_{10}/T^{n10}$ *

The mean annual precipitation for this area is **15"** per year**

INTENSITY CALCULATION TABLE

LOCATION	Tol	K_{10} ***	n10 ***		I in/hr
	0.36	0.7	0.52		1.19

* Section 7.5.2 on page 30

** Figure 15

*** Figure 14

RATIONAL FORMULA= CxIxA

FLOW CALCULATION TABLE

	AREA SQFT	AREA ACRS	I in/hr	C	Q cfs
		9.5	1.19	0.79	8.91

TOTAL FLOW (Q)	8.91

Assume that total site flow reaches culvert at the lowest point in El Camino Real at the same time:
This is very conservative assumption because not all stormwater flow to this system at the same time.

Size Pipe **Manning Formula**

Q = 8.91 cfs
n = 0.011
s = 0.02

$D = d_0 = 1.33(nQ/ S^{\wedge 0.5})^{\wedge (3/8)}$ **Full Flow**

D = 1.15' = 14" **EXISTING 15" WILL WORK**

Note:
There are three existing drainages system in this site. The first system, larger water shed,
is being sized and checked as above.
The second drainage system is at southeast corner of Kohls, connecting to an existing 15"diameter pipe
The third drainage system is at the gas station, 15 inches diameter.
The new total flow of main lot was calculated to be 8.91 cfs.
The required pipe diameter is 14" (10 years flood), Existing 15" diameter will work.
Assume the total site flow reaches the last inlet at the site all at the same time.